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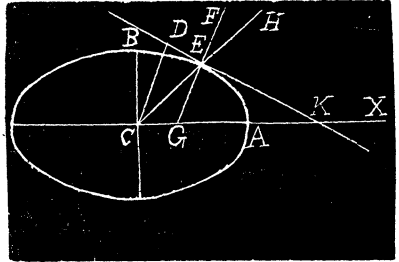
$CB=b$, $\angle ECA=\theta$, $\angle DCE=\angle CEG=\phi$, $\angle EKX=\beta$, co-ordinates of $E=(x,y)$.

Then $\tan \beta = -\frac{b^2 x}{a^2 y}$, $\tan \theta = \frac{y}{x}$, also

$$\beta = 90^\circ + \theta + \phi, \tan \beta = \tan (90^\circ + \theta + \phi) = -\cot (\theta + \phi).$$

$$\therefore \frac{h^2 x}{a^2 y} = \cot(\theta + \phi) = \frac{\cot \theta \cot \phi - 1}{\cot \theta + \cot \phi}$$

$$= \frac{\frac{x}{y} \cot \phi - 1}{\frac{x}{y} + \cot \phi}$$



$$\therefore \tan \phi = \frac{a^2 - b^2}{a^2 b^2} xy = \text{maximum} \dots (1). \quad \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \dots (2).$$

The first differentials of (1) and (2) give $b^2x^2 = a^2y^2$.

$$\therefore x = \frac{a}{\sqrt{2}}, y = \frac{b}{\sqrt{2}}, \therefore \tan \theta = \frac{b}{a} = (.9933254) = .996659, \therefore \theta = 44^{\circ} 54'$$

$$14''.9 = \text{the latitude} \quad \tan \phi = \frac{a^2 - b^2}{2ab} = \frac{.0066746}{1.993318} = .003348, \therefore \phi = 1' 30''.5$$

= maximum angle made with the perpendicular.

Also solved by Professor C. W. M. Black, and the Proposer.

PROBLEMS

36. Proposed by H. C. WHITAKER, B. Sc., M. E., Professor of Mathematics, Manual Training School, Philadelphia, Pennsylvania.

A cube is revolved on its diagonal as an axis. Define the figure described and calculate its volume.

37. Proposed by J. A. CALDERHEAD, Superintendent of Schools, Lima, Ohio.

A man ties two mules--one to the outside of a circular wall, the other to the inside. If the lengths of the ropes of each is one-fourth the circumference of the wall, and both together can graze over one acre of ground: find the circumference of the wall.